

### **Amendments to the claims**

1. (Currently Amended) A *S. clavuligerus* microorganism comprising DNA corresponding to one or more open reading frames essential for 5S clavam biosynthesis, wherein said open reading frames are disrupted or deleted such that the production of 5S clavams by said *S. clavuligerus* is reduced and clavulanic acid production is at least maintained, wherein the open reading frames are selected from:

- a) *cvm6para* (SEQ ID NO:1);
- b) *cvm7para* (SEQ ID NO:2);
- c) *cvm6para* and *cvm6* (SEQ ID NO:5); ~~or~~ and
- d) *cvm7para* and *cvm7* (SEQ ID NO:6).

2 (Currently Amended) A *S. clavuligerus* microorganism comprising DNA corresponding to one or more open reading frames essential for 5S clavam biosynthesis, wherein said open reading frames are disrupted or deleted such that the production of 5S clavams by said *S. clavuligerus* is reduced and clavulanic acid production is at least maintained, wherein the open reading frames are selected from:

- a) *cvm6para* and one or more of *cvm1* (SEQ ID NO:7), *cvm2* (SEQ ID NO:8), *cvm3* (SEQ ID NO:9), *cvm4* (SEQ ID NO:10), *cvm5* (SEQ ID NO:11), *cvm6*, *cvm7* or *cvm7para*; ~~or~~ and
- b) *cvm7para* and one or more of *cvm1*, *cvm2*, *cvm3*, *cvm4*, *cvm5*, *cvm6*, *cvm7* or *cvm6para*.

3. (Currently Amended) An isolated polynucleotide comprising one or more open reading frames selected from the group consisting of:

- a) *cvm6para*;
- b) *cvm7para*;
- c) *cvm6para* and *cvm6*;
- d) *cvm7para* and *cvm7*;
- e) *cvm6para* and one or more of *cvm1*, *cvm2*, *cvm3*, *cvm4*, *cvm5*, *cvm6*, *cvm7* or *cvm7para*; ~~or~~ and
- f) *cvm7para* and one or more of *cvm1*, *cvm2*, *cvm3*, *cvm4*, *cvm5*, *cvm6*, *cvm7* or *cvm6para*.

4. (Original) An isolated polynucleotide comprising one or more open reading frames encoding one or more enzymes involved in clavulanic acid biosynthesis wherein said open reading frames are selected from the group consisting of:

- a) *orf2para* (SEQ ID NO:12),
- b) *orf3para* (SEQ ID NO:13),

- c) *orf4para* (SEQ ID NO:14), and
- d) *orf6para* (SEQ ID NO:15).

5. (Original) An isolated polynucleotide comprising one or more open reading frames encoding one or more enzymes involved in clavulanic acid biosynthesis wherein said open reading frames comprise one or more of:

- a) *orf2para*,
- b) *orf3para*,
- c) *orf4para*,
- d) *orf6para*

in combination with one or more genes involved in clavulanic acid biosynthesis selected from *orf2*, *orf3*, *orf4*, *orf5*, *orf6*, *orf7*, *orf8*, *orf9*, *orf10*, *orf11*, *orf12*, *orf13*, *orf14*, *orf15*, *orf16*, *orf17*, or *orf18*.

6. (Currently Amended) An isolated polynucleotide selected from the group consisting of
- a) a polynucleotide comprising the nucleotide sequence of SEQ ID NO:16;
  - ~~b) a polynucleotide having the nucleotide sequence of SEQ ID NO:16; and~~
  - e) b) a polynucleotide comprising the nucleotide sequence of SEQ ID NO:17; ~~and~~
  - ~~d) a polynucleotide having the nucleotide sequence of SEQ ID NO:17.~~

7. (Currently Amended) A vector comprising the polynucleotide of claim 3 ~~of any one of claims 3 to 6~~.

8. (Original) A *S. clavuligerus* microorganism comprising the vector of claim 7.

9. (Currently Amended) A process for improving clavulanic acid production in a suitable microorganism comprising isolating the polynucleotide claim 3 ~~of any one of claims 3 to 6~~, manipulating said polynucleotide, introducing the manipulated polynucleotide into a said suitable microorganism and fermenting said suitable microorganism under conditions whereby clavulanic acid is produced.

10. (Original) A process according to claim 9 wherein the polynucleotide is a *cvm* or *cvmpara* polynucleotide and the manipulation comprises disrupting or deleting *cvm* or *cvmpara* gene sequences.

11. (Currently Amended) A process according to claim 9 18 wherein the polynucleotide is an *orf* or *orfpara* polynucleotides and manipulation thereof comprises insertion of the polynucleotide into vectors suitable for expression.
12. (Currently Amended) A process according to ~~any one of claims 9 to 11~~ claim 9 wherein the suitable microorganism is *S. clavuligerus*.
13. (New) A vector comprising the polynucleotide claim 4.
14. (New) A vector comprising the polynucleotide claim 5.
15. (New) A vector comprising the polynucleotide claim 6.
16. (New) A process for improving clavulanic acid production in a suitable microorganism comprising isolating the polynucleotide claim 4, manipulating said polynucleotide, introducing the manipulated polynucleotide into a said suitable microorganism and fermenting said suitable microorganism under conditions whereby clavulanic acid is produced.
17. (New) A process for improving clavulanic acid production in a suitable microorganism comprising isolating the polynucleotide claim 5, manipulating said polynucleotide, introducing the manipulated polynucleotide into a said suitable microorganism and fermenting said suitable microorganism under conditions whereby clavulanic acid is produced.
18. (New) A process for improving clavulanic acid production in a suitable microorganism comprising isolating the polynucleotide claim 6, manipulating said polynucleotide, introducing the manipulated polynucleotide into a said suitable microorganism and fermenting said suitable microorganism under conditions whereby clavulanic acid is produced.
19. (New) A process according to claim 10 wherein the suitable microorganism is *S. clavuligerus*.
20. (New) A process according to claim 11 wherein the suitable microorganism is *S. clavuligerus*.